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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,809	10/21/2003	Michael John Allen	P07,0140	9427

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EXAMINER	
BOWERS, NATHAN ANDREW	
ART UNIT	PAPER NUMBER
1775	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/690,809	ALLEN ET AL.	
	Examiner	Art Unit	
	NATHAN A. BOWERS	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-19 and 21-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-19 and 21-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 26 October 2010 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1) Claims 13-19 and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thundat (US 6289717) in view of Thundat (US 6016686) and Gimzewski (US 20050239047).

With respect to claims 13, 21 and 26, Thundat '9717 discloses a method for using a motion sensor comprising at least one force transducing sensor (Figure 1:3) is provided in the form of a microcantilever that is positioned to interact dynamically with a specimen (Figure 1:13) in a fluid sample. Column 2, lines 22-36 and column 3, lines 31-49 indicate that a variety of biological specimens, such as cells, are capable of binding

to a microcantilever. Changes in the subsequent deflection of the microcantilever can be detected in order to determine the presence and motion of the specimens. Column 5, lines 1-15 teach that this motion of the force transducing sensor can be measured by deflecting light from a laser (Figure 1:17) off of the microcantilever and onto a photodetector (Figure 1:19). Thundat '9717, however, does not expressly disclose a chamber capable of holding the motion sensor and the biological medium to be analyzed.

Thundat '6686 discloses a similar motion sensing method. Column 3, line 51 to column 4, line 29 indicates that a microcantilever (Figure 1:3) is capable of detecting and measuring changes in the presence of certain physical and chemical parameters within the sample solution, such as hydrogen ion concentration. Since changes in the hydrogen ion concentration of biological samples is often linked to the activity of living organisms, deflections in the microcantilever can also be used to determine the presence of cells. This is taught in column 10, lines 10-17. A transparent chamber (Figure 10) for containing the motion sensor and biological fluids is disclosed.

Thundat '9717 and Thundat '6686 are analogous art because they are from the same field of endeavor regarding motion sensors comprising microcantilever devices.

At the time of the invention, it would have been obvious to practice the method disclosed by Thundat '9717 using a chamber capable of holding the biological medium and the force transducing sensor. The use of a chamber would have been advantageous because it would have allowed one the ability of conducting experiments in a clearly defined and contained structure that is protected against external

contamination. Furthermore, a holding chamber for enclosing a sample would have been an essential and intrinsic component of any detection system involving the analysis of liquids. The use of chambers in biological analytical procedures to contain fluids and instruments is well known in the art.

The Thundat references still differ from Applicant's claimed invention because neither reference expressly discloses that residence time and/or motile frequency of a biological specimen on the cantilever is measured. Although Thundat '6686 depicts in Figure 12 that cantilever bending over time in response to fluid analytes is measured, Thundat '6686 does not expressly teach that the sensor is responsive to individual analyte contact and collisions.

Gimzewski discloses an atomic force microscope comprising a cantilever that continuously deflects and reverts back to its initial position in response to a series of mechanical forces exerted upon it. For example, Fig. 1 clearly depicts that changes in the vertical displacement of the cantilever over time are measured.

The Thundat references and Gimzewski are analogous art because they are from the same field of endeavor regarding microcantilever sensing systems.

At the time of the invention, it would have been obvious to use the Thundat '9717 system to measure the residence time and motile frequency of a plurality of successive biological analytes on the cantilever disclosed by Thundat. As evidenced by Gimzewski, it is well known in the art to record the amount of time a microcantilever is vertically displaced by a specific impacting force, as well as the time between a series of

discrete deflections. One of ordinary skill would have therefore recognized that the residence time of a motile specimen on the Thundat '9717 cantilever, and frequency at which motile specimens contact Thundat '9717 cantilever the would each be readily determined using known methods and calculations.

With respect to claims 14-19, Thundat '9717 and '6686 and Gimzewski disclose the method set forth in the 35 U.S.C. 103 rejections above. In addition, Thundat '9717 discloses in column 4, lines 15-40 that the surface of the force transducing sensor may be coated with a biologically active material in order to facilitate binding with appropriate specimens in the medium. Column 6, lines 39-45 teach that an untreated reference microcantilever (Figure 2:15) may be provided in close proximity to the detection microcantilever (Figure 2:3).

With respect to claims 22-25, Thundat '9717 and '6686 and Gimzewski disclose the method set forth in the 35 U.S.C. 103 rejections above. Although not expressly stated, the device proposed by Thundat '9717 is inherently capable of detecting motile cells, such as sperm, since microcantilever detection devices are provided with coatings that encourage the adherence of desired biological analytes. It is well within the purview of one of ordinary skill to use the Thundat '9717 method to evaluate a plurality of well known and medically important cells and biochemicals.

2) Claims 13-19 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welland (US 20030222232) in view of Gimzewski (US 20050239047).

With respect to claims 13 and 21, Welland discloses a motion sensing method comprising a chamber (Figure 1:4) for holding a medium, wherein the medium includes a sample. Paragraphs [0001] and [0002] indicate that the motion sensor is designed to determine the presence of pharmaceutical analytes in a biological sample fluid. According to paragraphs [0005]-[0009], the chamber includes at least one force transducing sensor (Figure 1:3) in the form of a microcantilever positioned to interact dynamically with the sample. Paragraph [0031] teaches that a photodiode (Figure 1:2) is provided for detecting light reflected off of the microcantilever from a laser diode (Figure 1:1). Welland teaches that the light is passed through a transparent substrate before it enters the chamber and contacts the cantilever. This allows one to determine when and to what degree the force transducing sensor interacts with analytes in the biological sample.

Welland still differs from Applicant's claimed invention because Welland does not expressly teach that the sensor is used to measure residence times and frequency of contact motile specimens on the cantilever.

Gimzewski discloses an atomic force microscope comprising a cantilever that continuously deflects and reverts back to its initial position in response to a series of mechanical forces exerted upon it. For example, Fig. 1 clearly depicts that changes in the vertical displacement of the cantilever over time are measured.

Welland and Gimzewski are analogous art because they are from the same field of endeavor regarding microcantilever sensing systems.

At the time of the invention, it would have been obvious to use the Welland system to measure the residence time and motile frequency of a plurality of successive biological analytes on the cantilever disclosed by Welland. As evidenced by Gimzewski, it is well known in the art to record the amount of time a microcantilever is vertically displaced by a specific impacting force, as well as the time between a series of discrete deflections. One of ordinary skill would have therefore recognized that the residence time of a motile specimen on the Welland cantilever, and frequency at which motile specimens contact Welland cantilever the would each be readily determined using known methods and calculations.

With respect to claims 14-19, Welland and Gimzewski disclose the method set forth in the 35 U.S.C. 103 rejections above. Welland additionally indicates that at least one force transducing sensor (Figure 1:3) in the form of a microcantilever is positioned within the chamber so as to be immersed in the medium during operation. A motion detector (Figure 1:2) is capable of determining binding of the microcantilever to biological specimens. Additionally, the surfaces of the force transducing sensor may be modified with coatings in order to facilitate effective binding to a desired analyte. This is disclosed in paragraphs [0005]-[0009] and [0031]. Paragraphs [0007] and [0036] and Figure 2 indicates that the motion sensor may include at least two cantilevers.

With respect to claims 22-25, Welland and Gimzewski disclose the method set forth in the 35 U.S.C. 103 rejections above. Although not expressly stated, Welland's device is inherently capable of detecting motile cells, such as sperm, since microcantilever detection devices are provided with coatings that encourage the adherence of desired biological analytes. It is well within the purview of one of ordinary skill to use the Welland method to evaluate a plurality of well known and medically important cells and biochemicals.

Response to Arguments

Applicant's arguments filed 26 October 2010 with respect to the 35 U.S.C. 103 rejections involving the Thundat references have been fully considered and are persuasive. Therefore, these rejections have been withdrawn. However, upon further consideration, a new ground of rejection is made in view of the combination of Thundat '9717 and '6686 and Gimzewski.

Gimzewski more explicitly recites a method in which the duration of individual deflections and the time between successive deflections is measured. Based on these teachings, one of ordinary skill would have found it obvious to use the Thundat system to calculate the residence time of a specimen on the cantilever, as well as the frequency at which specimens contact the cantilever.

Please also see the new 35 U.S.C. 103 rejection involving the combination of Welland with Gimzewski.

Conclusion

This is a non-final rejection.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan A. Bowers whose telephone number is (571) 272-8613. The examiner can normally be reached on Monday-Friday 8 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Marcheschi can be reached on (571) 272-1374. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Nathan A Bowers/
Primary Examiner, Art Unit 1775